Mr. Michael T. Davis Calculus	Section 4.1 Practice Quiz February 2, 2017

Name: Solutions

1. Find $\frac{dy}{dx}$ given $y=\sin(3x+1)$

$\frac{dy}{dx} = \cos(3x+1)\cdot 3 = 3\cos(3x+1)$

2. Find $f'(x)$ given $f(x)=\cos(2x^3)$

$f'(x) = -\sin(2x^3)\cdot 6x^2 = -6x^2\sin(2x^3)$

3. Find y' given $y=\tan(\sqrt{x})$

$y' = \sec^2(\sqrt{x})\cdot\frac{1}{2}x^{-\frac{1}{2}} = \frac{\sec^2(\sqrt{x})}{2\sqrt{x}}$

4. Find $\frac{dy}{dx}$ given $y=\sqrt{6x}$

$\frac{dy}{dx} = \frac{1}{2}(6x)^{-\frac{1}{2}}\cdot 6 = 3(6x)^{-\frac{1}{2}} = \frac{3}{\sqrt{6x}}$

5. Find $g'(x)$ given $g(x)=(5-\cos(3x))^2$

$g'(x) = 2(5-\cos(3x))(-\sin(3x)\cdot 3) = 6\sin(3x)(5-\cos(3x))$

6. Find y' given $y=(2x-1)^3(3-4x)^5$

$y' = 3(2x-1)^2\cdot 2(3-4x)^5 + (2x-1)^3\cdot 5(3-4x)^4(-4)$

$= 6(2x-1)^2(3-4x)^5 - 20(2x-1)^3(3-4x)^4$

7. Find $\frac{dy}{dx}$ given $y=\csc\left(\frac{x}{3}-\pi\right)$

$$\frac{dy}{dx} = -\csc\left(\tfrac{x}{3}-\pi\right)\cot\left(\tfrac{x}{3}-\pi\right)\cdot\left(\tfrac{1}{3}\right)$$
$$= -\tfrac{1}{3}\csc\left(\tfrac{x}{3}-\pi\right)\cot\left(\tfrac{x}{3}-\pi\right)$$

8. Find $k'(x)$ given $k(x)=x\sec(3-x^4)$ error

$$K'(x) = \sec(3-x^4) + x\cdot\sec(3-x^4)\tan(3-x^4)(-4x^3)$$
$$= \sec(3-x^4) - 4x^4\sec(3-x^4)\tan(3-x^4)$$

9. Find y' given $y=\frac{\sin(x^5)}{\cos(-x)}$

$$y' = \frac{\cos(-x)\cos(x^5)\cdot 5x^4 - \sin(x^5)\left(-\sin(-x)(-1)\right)}{(\cos(-x))^2}$$

10. Find $\frac{dy}{dx}$ given ~~$y=\csc\left(\frac{x}{3}-\pi\right)$~~ $y=\left(\frac{1}{\sqrt{x}}+\sqrt{x}\right)^2$

$$\frac{dy}{dx} = 2\left(\tfrac{1}{\sqrt{x}}+\sqrt{x}\right)\left(-\tfrac{1}{2}x^{-3/2}+\tfrac{1}{2}x^{-\frac{1}{2}}\right)$$

11. Find $p'(x)$ given $p(x)=\sqrt{\tan(2x)}$

$$p'(x) = \tfrac{1}{2}(\tan(2x))^{-\frac{1}{2}}\sec^2(2x)(2) = \frac{\sec^2(2x)}{\sqrt{\tan(2x)}}$$

12. Find y' given $y=\left(x^2\sin\left(\frac{2}{x}\right)\right)^3$

$$y' = 3\left(x^2\sin\left(\tfrac{2}{x}\right)\right)^2\left(2x\sin\left(\tfrac{2}{x}\right)+x^2\cdot\cos\left(\tfrac{2}{x}\right)\cdot(-2x^{-2})\right)$$

$y-\frac{\sqrt{3}}{2}=\frac{-1}{\sqrt{3}}\left(x-\frac{1}{2}\right)$ $y-\frac{\sqrt{3}}{2}=\frac{-\sqrt{3}}{3}\left(x-\frac{1}{2}\right)$

13. Multiple Choice: Find the equation of the line tangent to the curve at the point defined by $t=\frac{\pi}{6}$. The curve is defined parametrically by $x=\sin t$ and $y=\cos t$

a. $y-\frac{1}{2}=\frac{-\sqrt{3}}{3}\left(x-\frac{\sqrt{3}}{2}\right)$

b. $y-\frac{1}{2}=-\sqrt{3}\left(x-\frac{\sqrt{3}}{2}\right)$

(c.) $y-\frac{\sqrt{3}}{2}=\frac{-\sqrt{3}}{3}\left(x-\frac{1}{2}\right)$

d. $y-\frac{\sqrt{3}}{2}=\frac{\sqrt{3}}{3}\left(x-\frac{1}{2}\right)$

e. $y+\frac{\sqrt{3}}{2}=\frac{-\sqrt{3}}{3}\left(x-\frac{1}{2}\right)$

$x=\sin\frac{\pi}{6}=\frac{1}{2}$ $y=\cos\frac{\pi}{6}=\frac{\sqrt{3}}{2}$

$\frac{dx}{dt}=\cos t$ $\frac{dx}{dt}=\cos\frac{\pi}{6}=\frac{\sqrt{3}}{2}$

$\frac{dy}{dt}=-\sin t$ $\frac{dy}{dt}=-\sin\frac{\pi}{6}=-\frac{1}{2}$

$y-\frac{\sqrt{3}}{2}=\frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}}\left(x-\frac{1}{2}\right)$

14. Find the equation of the line tangent to the curve at the point defined by $t=\frac{\pi}{3}$. The curve is defined parametrically by $x=\sec t$ and $y=\tan t$

$x=\sec\frac{\pi}{3}=2$ $y=\tan\frac{\pi}{3}=\sqrt{3}$ $\frac{dx}{dt}=\sec t\tan t$

$\frac{dx}{dt}=\sec\frac{\pi}{3}\tan\frac{\pi}{3}=2\sqrt{3}$ $\frac{dy}{dt}=\sec^2 t$ $\frac{dy}{dt}=\sec^2\frac{\pi}{3}=4$

$\frac{dy}{dx}=\frac{4}{2\sqrt{3}}=\frac{2}{\sqrt{3}}$ $y-\sqrt{3}=\frac{2}{\sqrt{3}}(x-2)$

Find $\frac{d^2y}{dx^2}$

15. Find $\frac{dy}{dx}$ given $y=\cos(5-x)$

$\frac{dy}{dx}=-\sin(5-x)(-1)=\sin(5-x)$

$\frac{d^2y}{dx^2}=\cos(5-x)(-1)=-\cos(5-x)$

Find $\frac{d^2y}{dx^2}$

16. Find $\frac{dy}{dx}$ given $y=\cos^2(5-x)$

$\frac{dy}{dx}=2\cos(5-x)(\sin(5-x)(-1)=-2\cos(5-x)(\sin(5-x))$

$=-\sin(10-2x)$

$\frac{d^2y}{dx^2}=-\cos(10-2x)(-2)=2\cos(10-2x)$

17. Find y'' given $y=\left(\frac{1}{2}x^2+5\right)^3$ $y'=3\left(\frac{1}{2}x^2+5\right)^2(x)=3x\left(\frac{1}{2}x^2+5\right)$

$y''=3\left(\frac{1}{2}x^2+5\right)+3x(x)=\frac{3}{2}x^2+15+3x^2=\frac{9}{2}x^2+15$